

U.S.S.N. 10/731,331

Remarks

Thorough examination by the Examiner is noted and appreciated.

The claims have been amended to further clarify Applicants disclosed and claimed invention and further define over the cited art.

No new matter has been added.

For example, support for the amendments is found in the originally and previously presented claim, the Figures, including Figure 4 and in Specification.

Claim Rejections under 35 USC 103

1. Claims 1-4, 7-10, 23-24, 26-27 and 29 stand rejected under 35 USC 103(a), as being unpatentable over Lakshmikanthan et al. (US 6,228,233) in view of Oberlitner et al. (US 6, 547, 937).

Lakshmikanthan et al. discloses a bladder assembly (130; Figure 2B) where the bladder assembly is adapted to press a

U.S.S.N. 10/731,331

substrate 121 against **contact ring pins** (119; Figure 2) where the substrate (121) is **between the contact ring pins and the bladder** (the bladder contacts only the peripheral portion of the wafer backside non plating surface while the contact ring contacts the wafer frontside plating surface) (see Abstract). Lakshmikanthan et al. disclose that the contact ring includes plurality of pins (119, Fig 2 or 26, Figure 1) about the peripheral portion of the substrate that extend radially inward over a narrow portion of the substrate (see col 1, lines 53-60; col 4, lines 50-51; col 6, lines 47-50; col 7, lines 16-20).

Lakshmikanthan et al. further disclose that a pressure or a vacuum may be applied to the **backside (non-plating surface)** of the substrate through a pumping system (159, Figure 2) while also operating the bladder assembly (col 7, lines 42-55). The pumping system 159 delivers pressure (or vacuum) **through a single centrally disposed port** (141; Figure 2) on mounting plate 132 (see col 5, lines 15-19) to a space between the mounting plate and the substrate backside. Lakshmikanthan et al. teach that applying a pressure of (5 PSI) to the backside of the wafer through the **through the single centrally disposed port** may advantageously cause **downward bowing** of the substrate to form a **convex plating surface on the frontside of the wafer** (col 7, lines (col 7, lines 34-54).

U.S.S.N. 10/731,331

The apparatus of Lakshmikanthan et al. overcomes the problem of **backside nonuniformities on the substrate to achieve uniform contact resistances between the contact ring pins and substrate (frontside) to deposit a uniform metal layer on the substrate (frontside)** (col 3, lines 5-19.

Thus, Lakshmikanthan et al. fail to disclose several aspects of Applicants invention including those elements in **bold type**.

"A thrust pad assembly for mounting a substrate in an electroplating system, comprising:

a contact ring adapted to electrically connect to the electroplating system and engage a backside non-plating surface of the substrate across a diameter of said substrate; and

a variable pressure application system adapted to operably engage said contact ring, said variable pressure application system adapted to apply a central pressure to a center region of the substrate backside through said contact ring and a peripheral pressure less than said central pressure to an edge region of the substrate backside through said contact ring."

U.S.S.N. 10/731,331

In contrast, Oberlitner et al. disclose a processing tool including a current thief processing a square substrate piece within a fluid (e.g., electroplating a magnetic alloy without spinning the square substrate see col 7, lines 42-50) where the current thief (170; Figures 25-26) **redirects** the plating materials away from the edge of the substrate (col 16, lines 7-26) and where the inner portion of the current thief (204, Figure 27) includes a non-conductive seal (212) which contacts the substrate (col 17, lines 4-7) **(i.e., the current thief is electrically insulated from the substrate)**. In addition, contact is made with the backside of the substrate with a belville ring (196; see Figure 23) to provide electrical power to the substrate and to a seed layer (218; Figure 27; col 17, lines 10-15) on the frontside (processing surface) of the substrate including conductive elements (198; Figures 23, 27) extending inwardly at discrete positions (conductive points on the ring) around the belville ring (col 15, lines 60-67; col 15, lines 65-col 17, lines 2) **which are pressed down by the ring base (174; Figure 27) to scrape the backside of the edge of the substrate.**

Oberlitner et al. make the general statement that (at col 17, lines 17-20):

"While a backside contact has been disclosed in connection with the disclosed embodiment, one skilled in the art should

U.S.S.N. 10/731,331

readily appreciate that other embodiments incorporating front side contact would similarly be possible."

Oberlitner et al. does not disclose such frontside contacts or explain how such contacts would be provided without scraping and ruining the process surface.

Thus, Examiners assertion that Oberlitner et al. teach that frontside and backside contacts are functionally equivalent is not supported by the teaching of Oberlitner et al.

For example, modifying the device of Lakshmikanthan et al. based on the teachings of Oberlitner et al. (i.e., replacing the arrangement of a bladder ring pressing on the backside of a substrate and a contact ring on the frontside (processing side) of the substrate where the substrate is between the contact ring and the bladder ring where pressure is exerted around the edge of the substrate), with the backside contact ring of Oberlitner et al. (pointed extensions on the contact ring) making contact with the backside of the device of Lakshmikanthan et al., would make the device of Lakshmikanthan et al. unworkable and unsuitable for its intended purpose; i.e., the substrate pinched between the frontside contact ring and the backside bladder at the periphery of the substrate of Lakshmikanthan et al., which allows pressure to be delivered to the backside of the substrate to

U.S.S.N. 10/731,331

advantageously bow the substrate downward to form a convex plating surface, **would be rendered unworkable and unsuitable for its intended purpose.**

Nevertheless, such modification does not produce Applicants invention including those elements in **bold type** as well as underlined:

"a variable pressure application system adapted to operably engage said contact ring, said variable pressure application system adapted to apply a central pressure to a center region of the substrate backside through said contact ring and a peripheral pressure less than said central pressure to an edge region of the substrate backside through said contact ring."

Examiner asserts that the variable pressure application system as taught by Lakshmikanthan et al. in view of Oberlitner is **capable** of engaging the backside contact ring and apply pressure to the central and peripheral regions of the substrate backside as claimed".

Examiner thus ignores the plain meaning of Applicants claim language as would be understood by one of ordinary skill in the art.

U.S.S.N. 10/731,331

That is, since the contact ring of both Lakshmikanthan et al. and Oberlitner only contact the edge regions of the substrate, they would not be capable of:

apply a central pressure to a center region of the substrate backside through said contact ring and a peripheral pressure less than said central pressure to an edge region of the substrate backside through said contact ring."

See e.g., MPEP 2111.01:

During examination, the claims must be interpreted as broadly as their terms reasonably allow. This means that the words of the claim must be given their plain meaning unless applicant has provided a clear definition in the specification. *In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989).

When not defined by applicant in the specification, the words of a claim must be given their plain meaning. In other words, they must be read as they would be interpreted by those of ordinary skill in the art. *In re Sneed*, 710 F.2d 1544, 218 USPQ 385 (Fed. Cir.1983).

Nevertheless, Applicants have now further amended their claims to overcome Examiner's mistaken interpretation of Applicants claims and make clearly explicit what was already implicit in the previously presented claims i.e.,

"a contact ring adapted to electrically connect to the

U.S.S.N. 10/731,331

electroplating system and engage a backside non-plating surface of the substrate across a diameter of said substrate;"

Examiner further asserts without support in the teachings of Lakshmikanthan et al. that since the pressure delivered from the bladder system and the **pressure delivered to the backside of the substrate are separately controllable** "Examiner concludes that the variable pressure application system of Lakshmikanthan is **capable** of asserting a lower peripheral pressure and a higher central pressure on the wafer as claimed"

With respect to claims 2 and 8, Examiner is clearly mistaken that the mounting plate of Lakshmikanthan et al. 'reads on' Applicants thrust pad. It is clear that the structural relationship of the mounting plate and contact ring of Lakshmikanthan et al. is completely different than that of Applicants.

With respect to claims 4 and 10, Examiner is clearly mistaken, and it is nowhere taught in Lakshmikanthan et al. that the mounting plate of Lakshmikanthan et al. **is capable** of accomplishing Applicants operable functions or discloses Applicants structure.

U.S.S.N. 10/731,331

It is further noted, that regardless of any **capability** asserted by Examiner, the prior art must teach or suggest Applicants **structure**.

"**First**, there must be some **suggestion or motivation**, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. **Second**, there must be a **reasonable expectation of success**. **Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

2. Claims 5-6, 11-12, 25, 28, and 30 stand rejected under 35 USC 103(a), as being unpatentable over Lakshmikanthan et al., in view of Oberlitner et al., above, and further in view of Dordi et al. (US 6,416,647)

Applicants reiterate the comments made above with respect to Lakshmikanthan et al.

U.S.S.N. 10/731,331

Even assuming *arguendo* a proper motivation to combine the teachings of Lakshmikanthan et al. and Dordi et al., the fact that Dordi et al. discloses a vacuum chuck having vacuum ports (channels disposed in a web-like fashion) (see 296; Figure 2; col 6, lines 34-36) on the chuck surface to provide suction during processing or a blow-off gas **during substrate transfers to prevent backside contamination**, and where the vacuum ports (channels) are adapted to provide a **single pressure** (col 7, lines 5-22), does not further help Examiner in producing Applicants invention.

Moreover, the stated motivation by Examiner for modifying Lakshmikanthan et al. "in order to prevent backside contamination" would **change the principle of operation** of the apparatus of Lakshmikanthan et al., i.e., and make it **unsuitable for its intended purpose**, , i.e., the annular bladder assembly of Lakshmikanthan et al., forms a seal with the backside of the substrate at the periphery while the central opening in the mounting plate of Lakshmikanthan et al. together with the sealed periphery, allows pressure to be applied in order to cause outward (downward) bowing of the wafer to form a convex plating surface.

U.S.S.N. 10/731,331

Examiner merely concludes that the above argument is not persuasive, i.e., would not change the principle of operation of and make it unsuitable for its intended purpose "since the multiple vacuum ports as taught by Dordi is also used to provide blow-off gas to prevent backside contamination" that therefore these ports are capable of providing variable pressure to the backside of the substrate (i.e., negative pressure when vacuum is applied and positive pressure when blow-off gas is applied)".

Thus, Examiner ignores the fact that the bladder ring of Lakshmikanthan et al. is supplied with positive pressure at the edges of the ring while the central gas opening of Lakshmikanthan et al. applies either positive pressure or vacuum to the central portion of the backside of the substrate (not through the contact ring) **and does not and could not supply a blow-off gas** as taught by Dordi to prevent backside contamination (i.e., if a blow-off gas were supplied i.e., the backside not sealed as in Lakshmikanthan et al., the device of Lakshmikanthan et al. would be **unsuitable for its intended purpose.**

It is further noted that the above is not merely an argument by Applicants but, rather such proposed modification by Examiner is prohibited **as a matter of law:**

U.S.S.N. 10/731,331

"If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious." *In re Ratti*, 270 F.2d 810, 123, USPQ 349 (CCPA 1959).

"If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

In any, event such modification, as noted above, **does not produce Applicants invention.**

"First, there must be some **suggestion or motivation**, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. **Second**, there must be a **reasonable expectation of success**. **Finally**, the prior art reference (or references when combined) **must teach or suggest all the claim limitations**. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's

U.S.S.N. 10/731,331

disclosure." *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Conclusion

The cited references, both individually and in combination, do not produce or suggest Applicants invention, and are therefore insufficient to make out a *prima facie* case of obviousness.

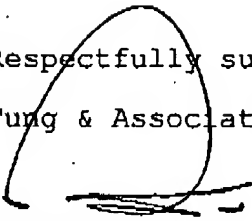
The Claims have been further amended to further define over the cited art and clearly overcome Examiners claim interpretation. A favorable consideration of Applicants' claims is respectfully requested.

Based on the foregoing, Applicants respectfully submit that the Claims are now in condition for allowance. Such favorable action by the Examiner at an early date is respectfully solicited.

In the event that the present invention as claimed is not in condition for allowance for any reason, the Examiner is respectfully invited to call the Applicants' representative at his Bloomfield Hills, Michigan office at (248) 540-4040 such that necessary action may be taken to place the application in a condition for allowance.

U.S.S.N. 10/731,331

Respectfully submitted,
Tung & Associates



Randy W. Tung
Reg. No. 31,311
Telephone: (248) 540-4040